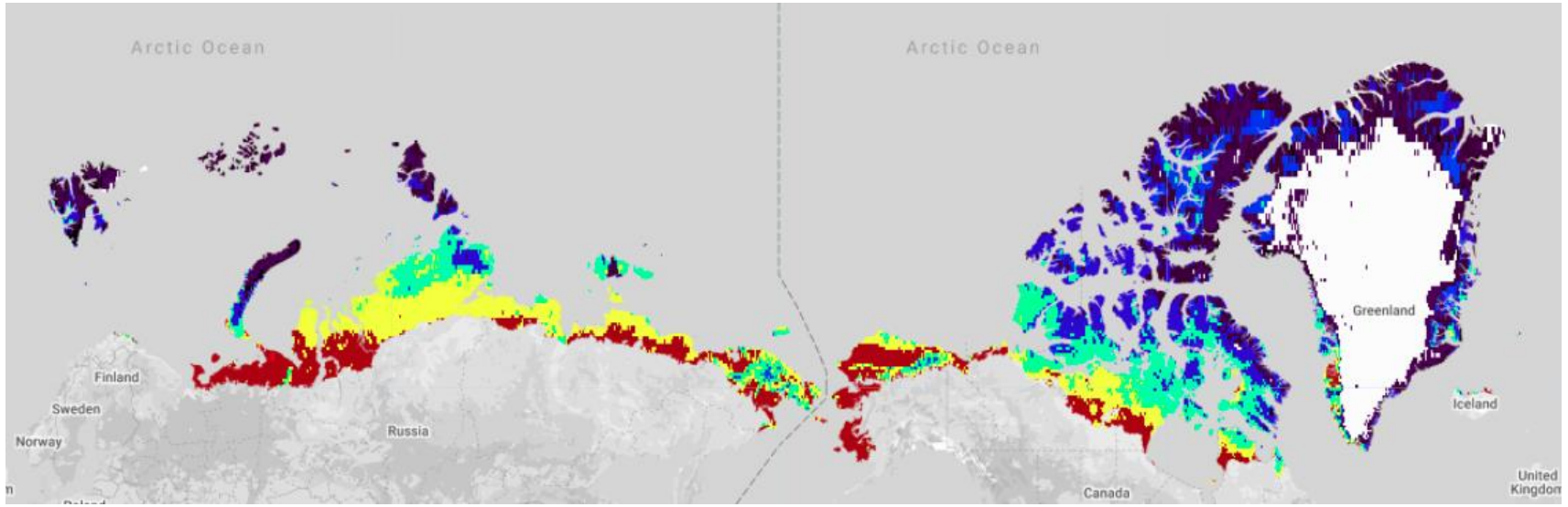
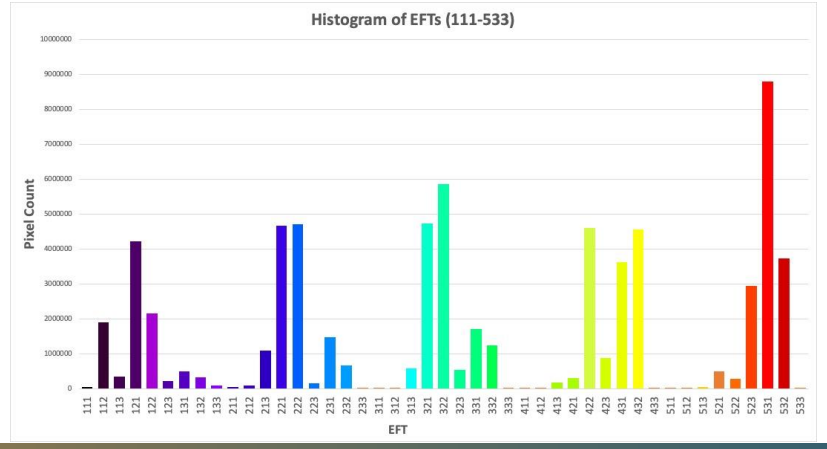


Arctic Ecosystem Functional Diversity

Howard Epstein, University of Virginia
Amanda Armstrong, Domingo Alcaraz-Segura, Morgan Tassone, Elisa Montefiori, Martha Raynolds



MODIS 16-day composite NDVI
Three functional attributes of the mean seasonal NDVI curve – related to magnitude and phenology.

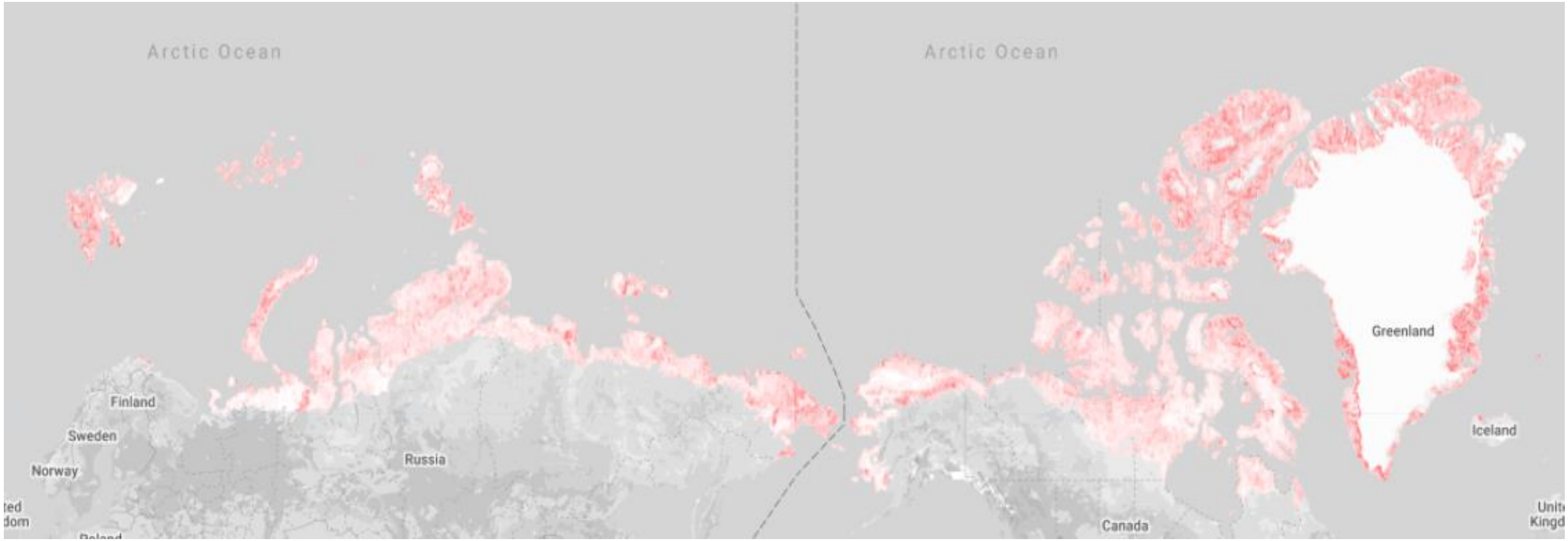


PRODUCT USERS:

- GEO-BON Ecosystem Function Working Group
- GEO-BON Arctic-BON
- Google Earth Engine
- NASA ABoVE
- Other GEO projects

RESULTS

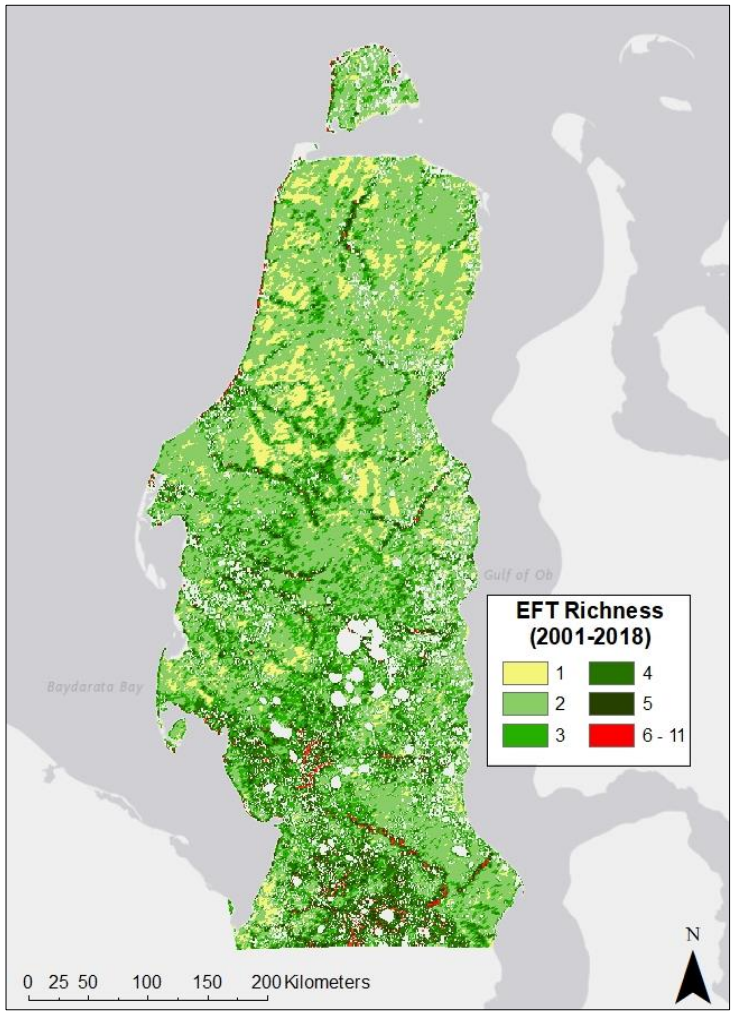
Ecosystem Functional Diversity (i.e. EFT richness) of the Circumpolar Arctic

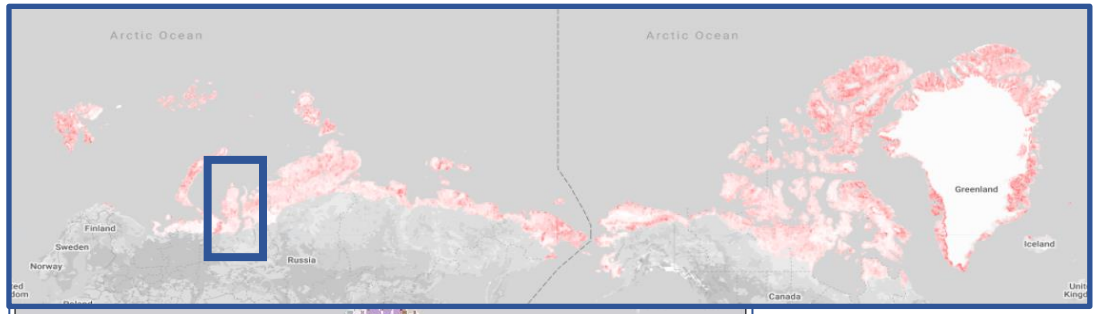


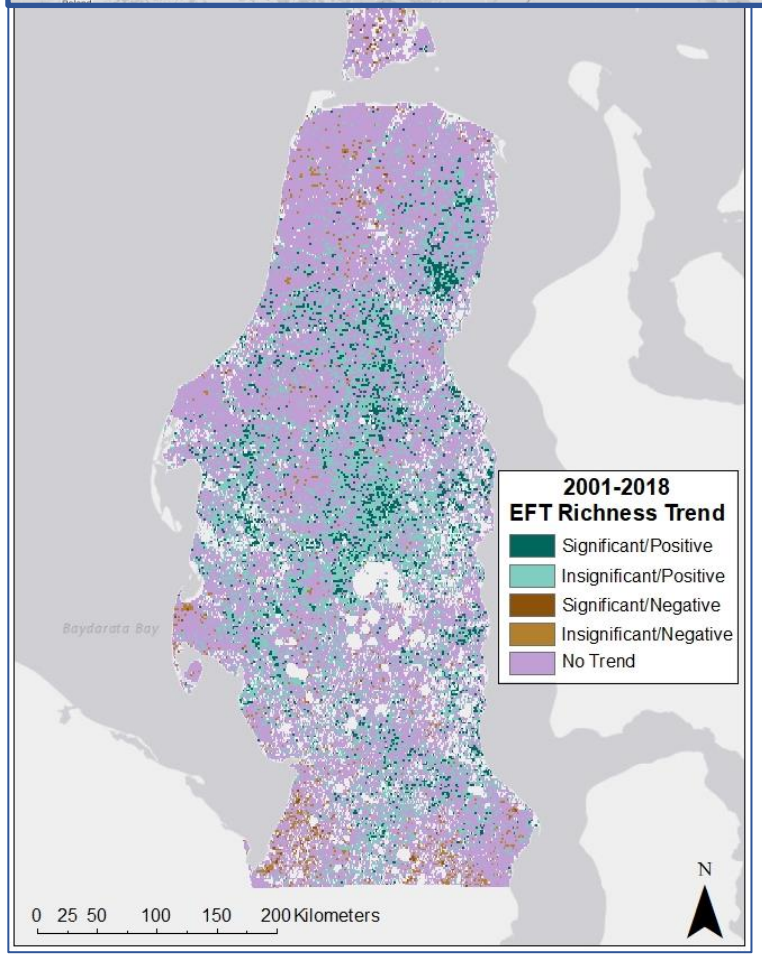
Darker red areas have greater Ecosystem Functional Diversity,
i.e. landscapes are more functionally heterogeneous

RESULTS

Regional Trends in Functional Diversity and their Controls





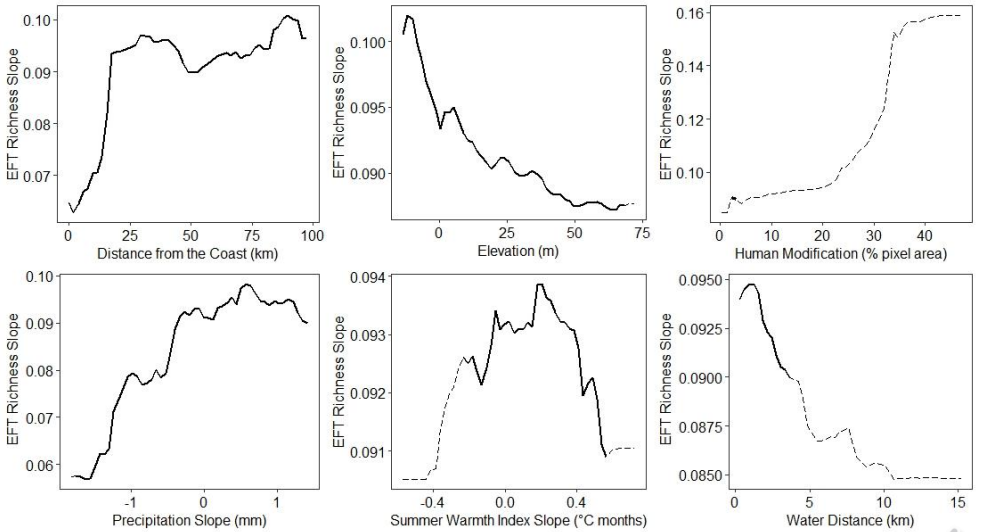


YAMAL PENINSULA

- 30.0% positive trend
- 2.8% negative trend

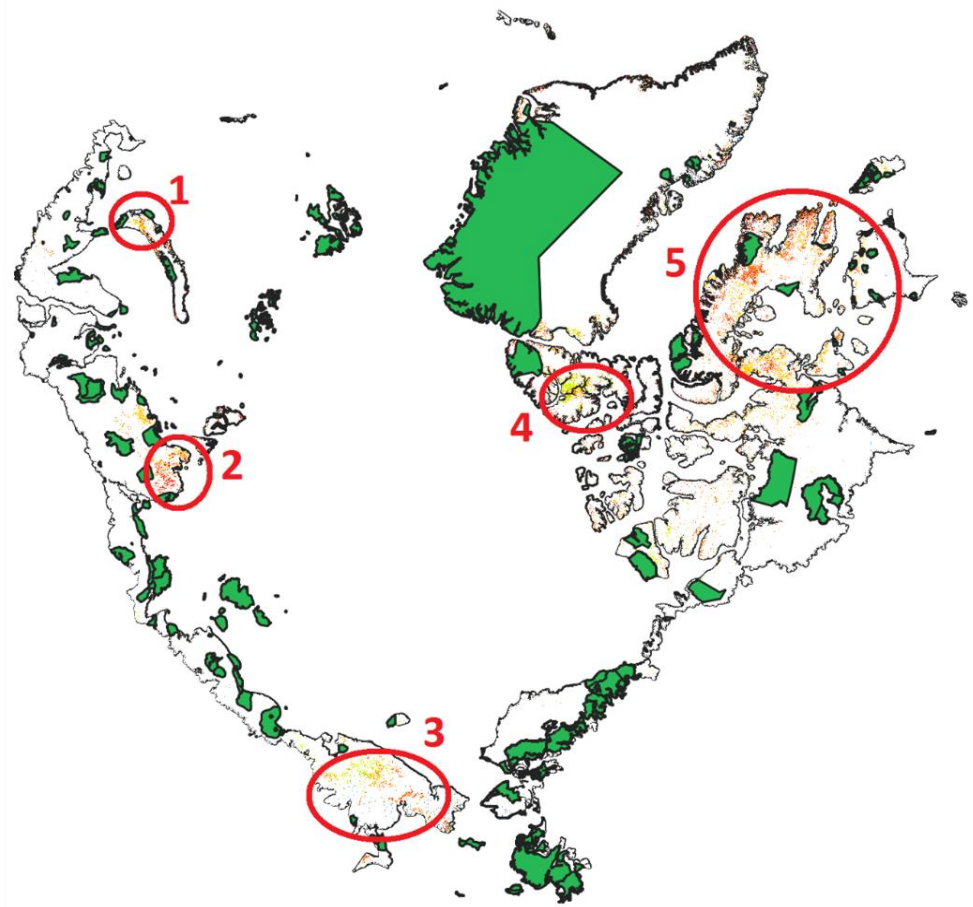
- +Distance from Coast
- +Precipitation
- +Human Modification

- -Elevation
- -Distance from Water



RESULTS

Gap Analysis – Protected Area Network

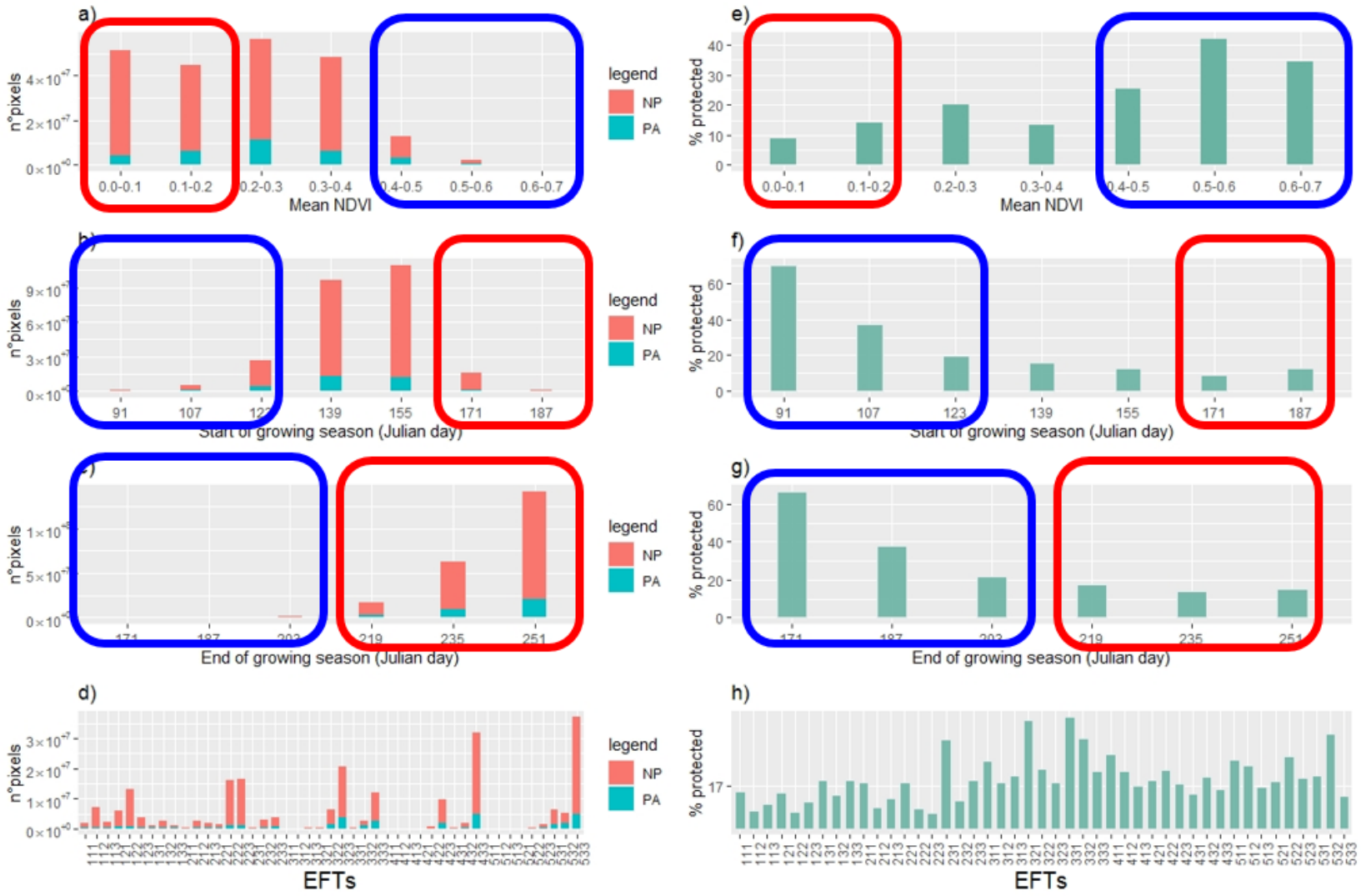


The **red circles** represent the **gaps in conservation:**

Protected areas covered less than 17% of the areas of the rarest Ecosystem Functional Types

RESULTS

Protection based on specific aspects of functionality



Well protected:

- High productivity areas
- Early start of growing season
- Early end of growing season

Scarcely protected:

- Low productivity areas
- Late start of growing season
- Late end of growing season

PROJECT OUTCOMES

- Developed a Functional Classification of the circumpolar Arctic tundra
- Mapped Functional Diversity throughout the Arctic
- Identified the environmental controls on ecosystem function and functional diversity
- Utilized the data for a Gap Analysis of conservation
- Tools are generalizable for other biomes and across scales

FUTURE

- Use of Products/Algorithms by GEO-BON
- Google Earth Engine API
- Circumpolar Controls on Ecosystem Functional Diversity and Trends (AGU)
- Continue to Support NASA ABoVE Initiatives